

Jun 21st, 1:15 PM - 1:30 PM

# Modeling: Using 2D HEC-RAS to Determine Fish Passability and Habitat Quality

Suzie Monk  
WEST Consultants

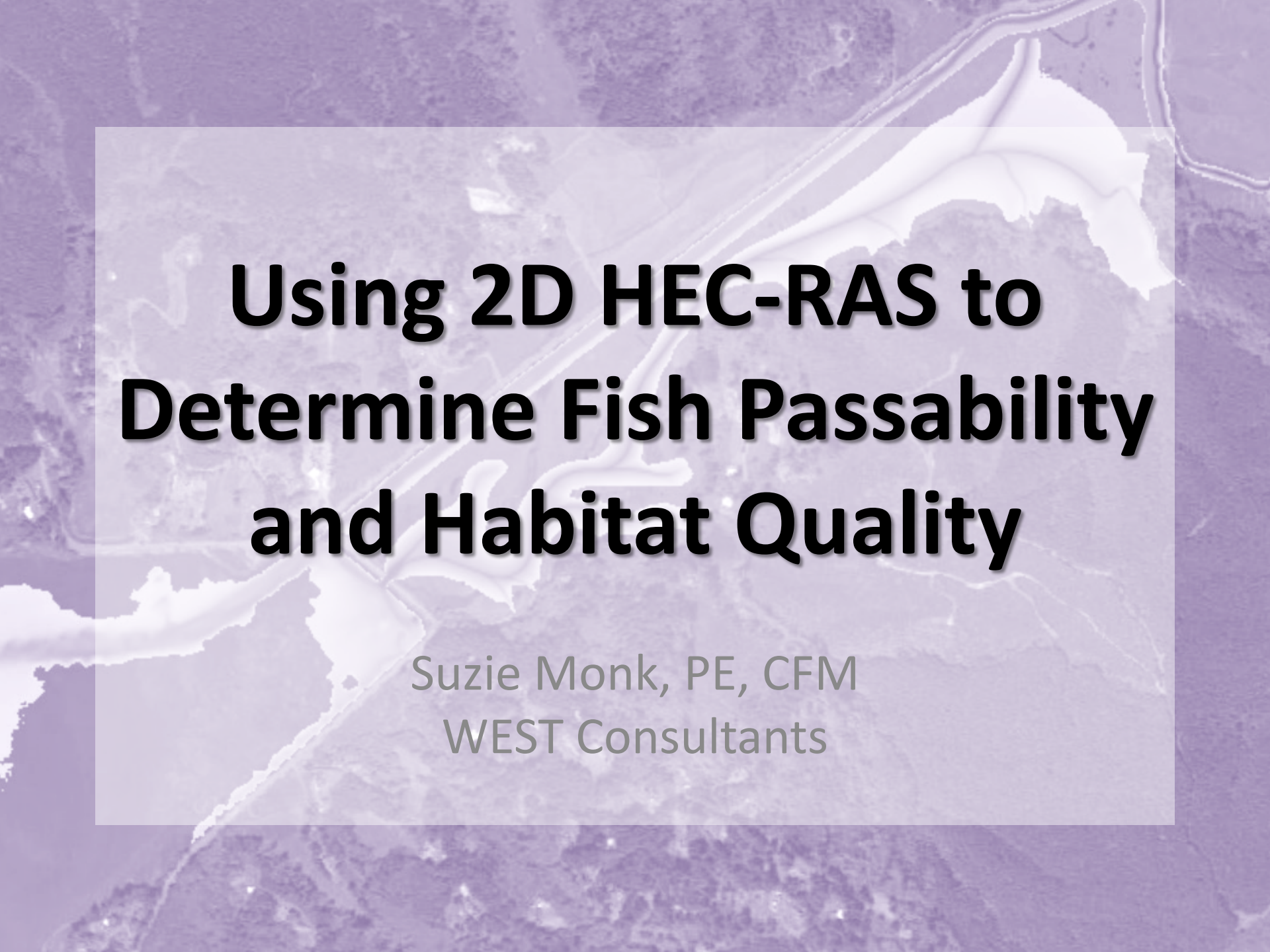
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Monk, Suzie, "Modeling: Using 2D HEC-RAS to Determine Fish Passability and Habitat Quality" (2016). *International Conference on Engineering and Ecohydrology for Fish Passage*. 41.

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An aerial photograph of a river system, likely a delta or estuary, with a semi-transparent purple rectangular overlay in the center. The overlay contains the title and presenter information in white text.

# **Using 2D HEC-RAS to Determine Fish Passability and Habitat Quality**

Suzie Monk, PE, CFM  
WEST Consultants

# Background

- 1D RAS solves dynamic St. Venant mass and momentum equations in one dimensions
  - User determines which direction water will flow
- 2D RAS solves dynamic St. Venant mass and momentum equations in two dimensions (laterally, not depth-wise)
  - Terrain determines which direction water will flow

# When to Use 2D RAS

- Off-channel storage areas
- Undefined boundary between channel and banks
- Bends
- Flow direction changes at different flows/stages
- Complex ineffective areas



# When Not to Use 2D RAS

- Bridges
- Salinity/temperature/water quality
- 1D modeling is sufficient
- Good topographic data not available

# Ease of Use

1. Define projection
2. Develop terrain (TIN) and land coverage (shp)
3. Develop mesh
4. Define boundary conditions
5. Run model
6. View results

\*(repeat from step 2 if desired)

# RASMapper

- Currently a post-processing tool
- Greater visualization capabilities
- Maps results on terrain
- Adjust terrain within RASMapper
- Developing RASMapper to do pre-processing as well







# Area Background



- Canal carries the bulk of the water
- Restoration area was a golf course
- Stream historically moved through the golf course out into the bay
- Neglected tidal influences for this example

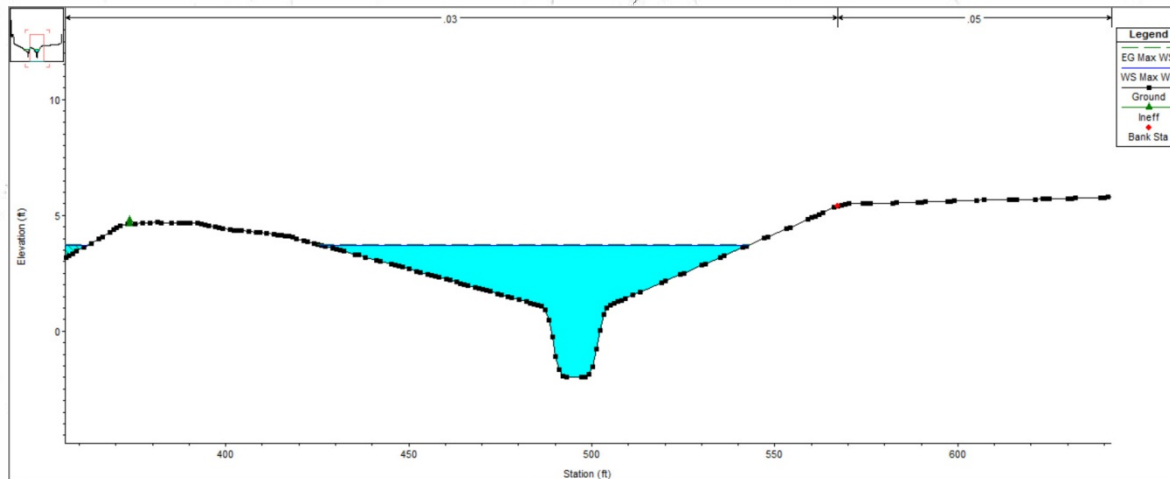
# Model Setup












# Restoration Area Details

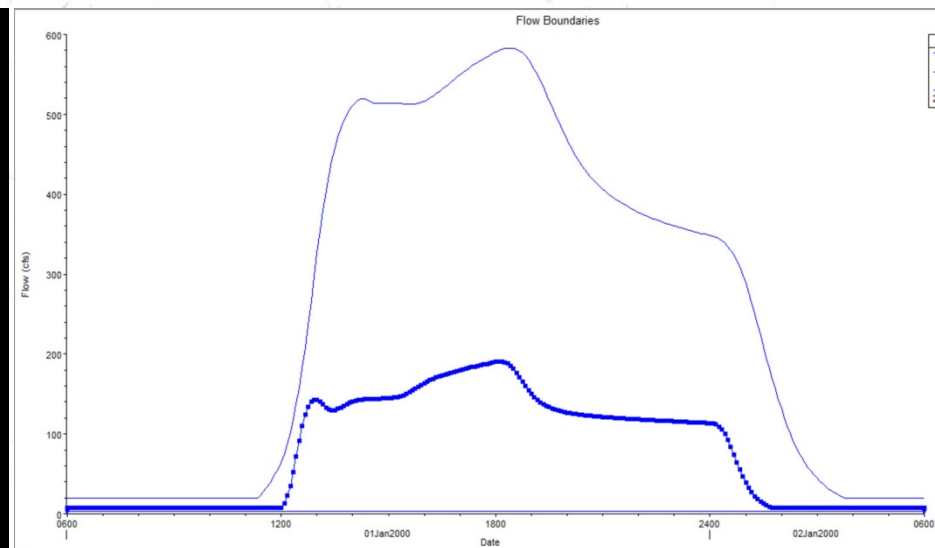
- Restored area max slope: 0.1%
- Representative channel dimensions: 18 ft across, 3 ft deep
- Restoration reach length: 1 mile
- Cell size: 20 ft grid



1D 2-year

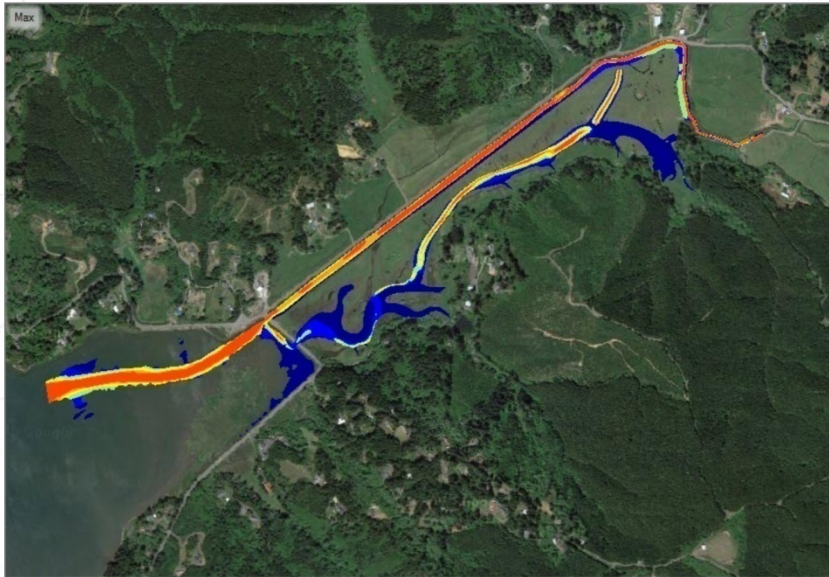
Vel	Color
0.00	
0.4	
0.8	
1.1	
1.5	
1.8	
15.00	

2D 2-year

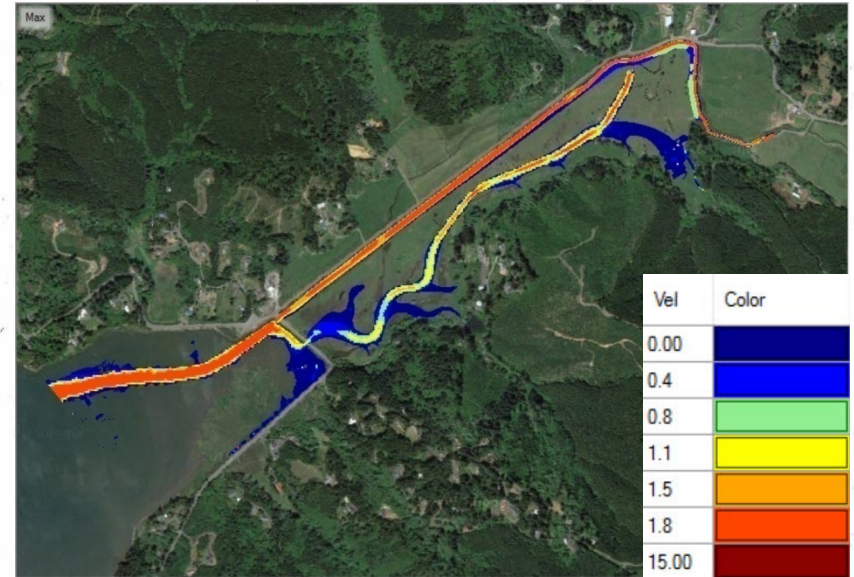




1D 2-year

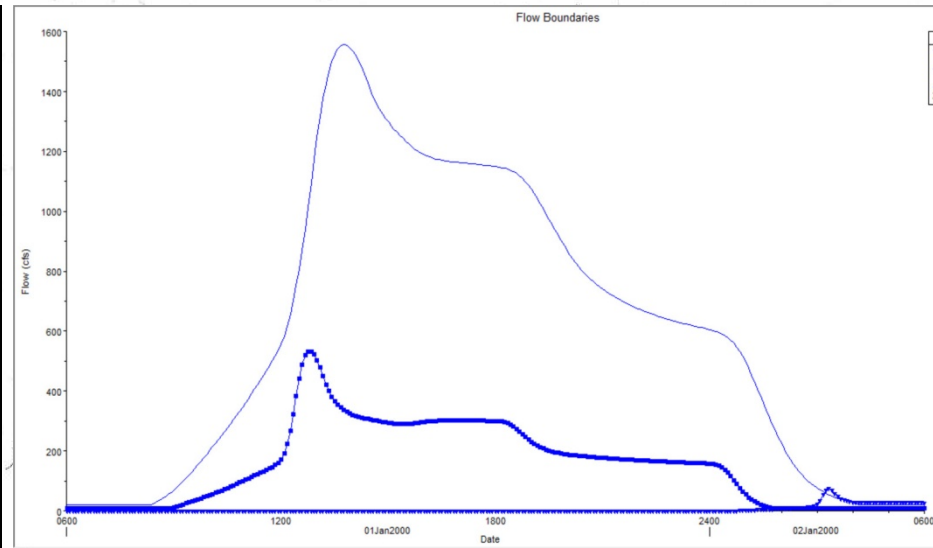


2D 2-year



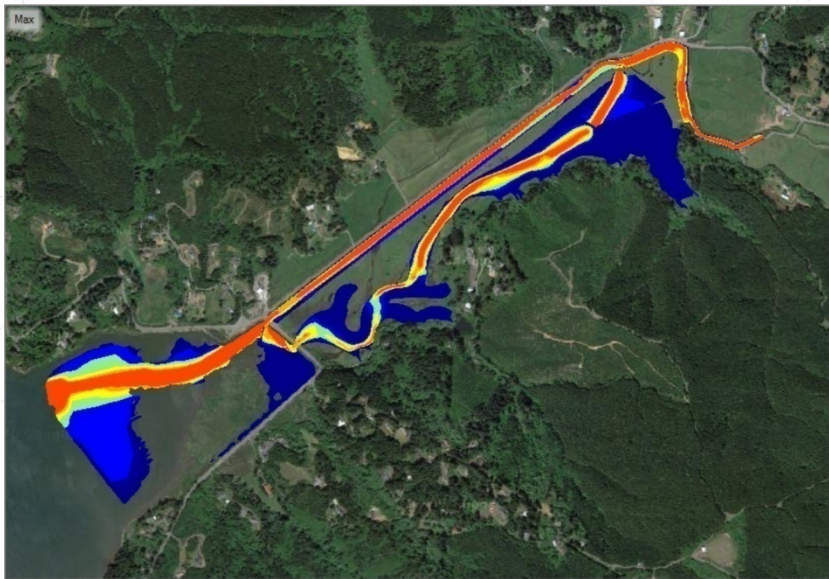


Vel	Color
0.00	Dark Blue
0.4	Blue
0.8	Light Green
1.1	Yellow
1.5	Orange
1.8	Red-Orange
15.00	Dark Red

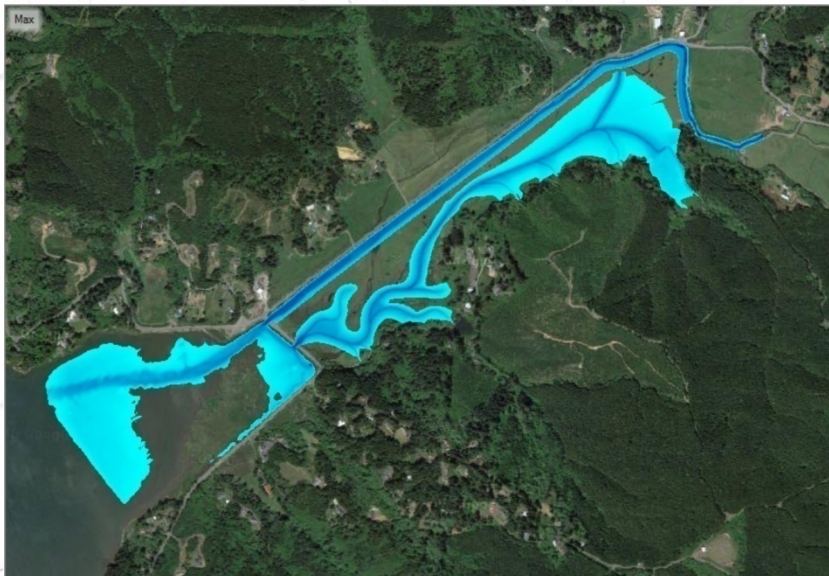
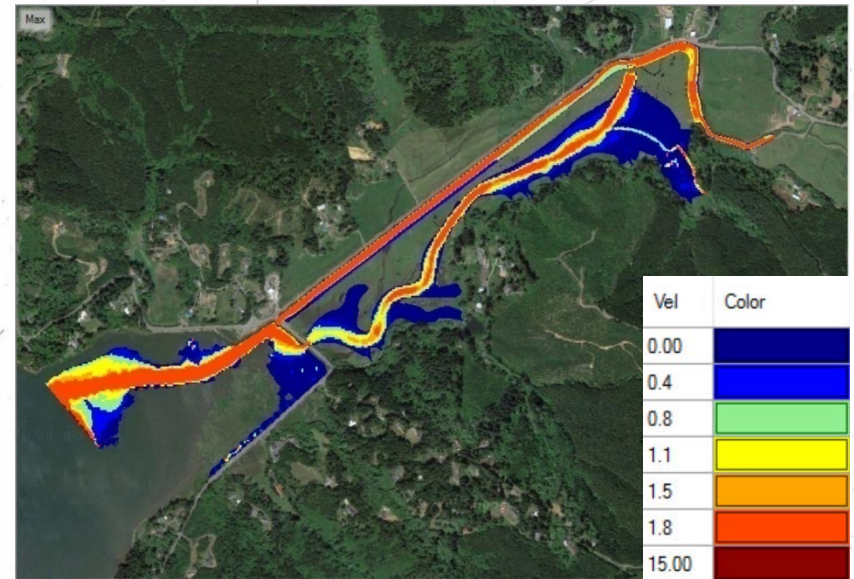




1D 50-year



2D 50-year

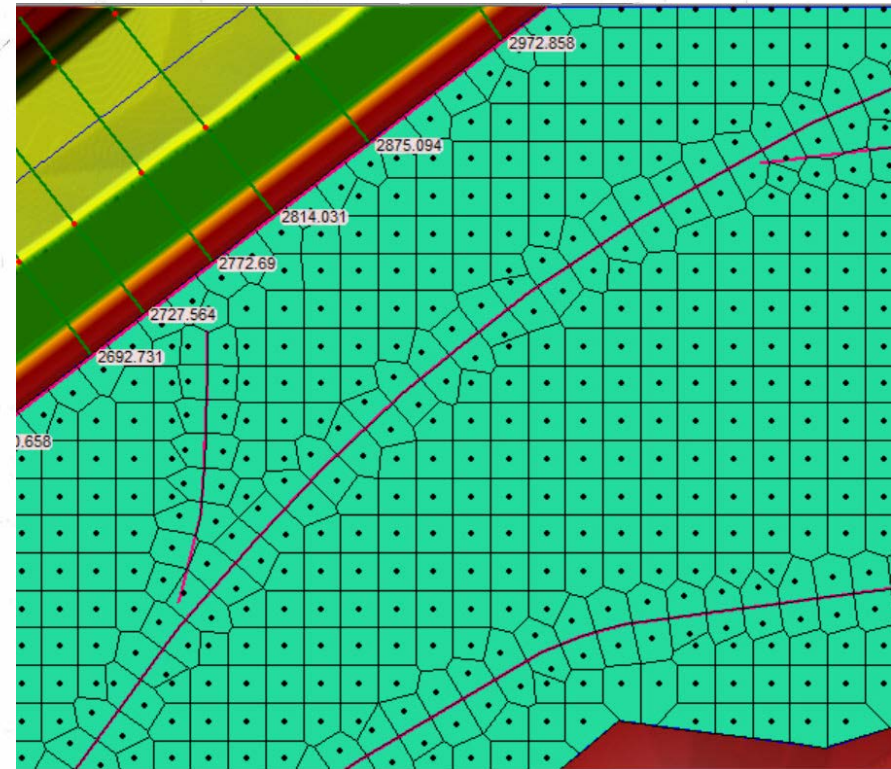
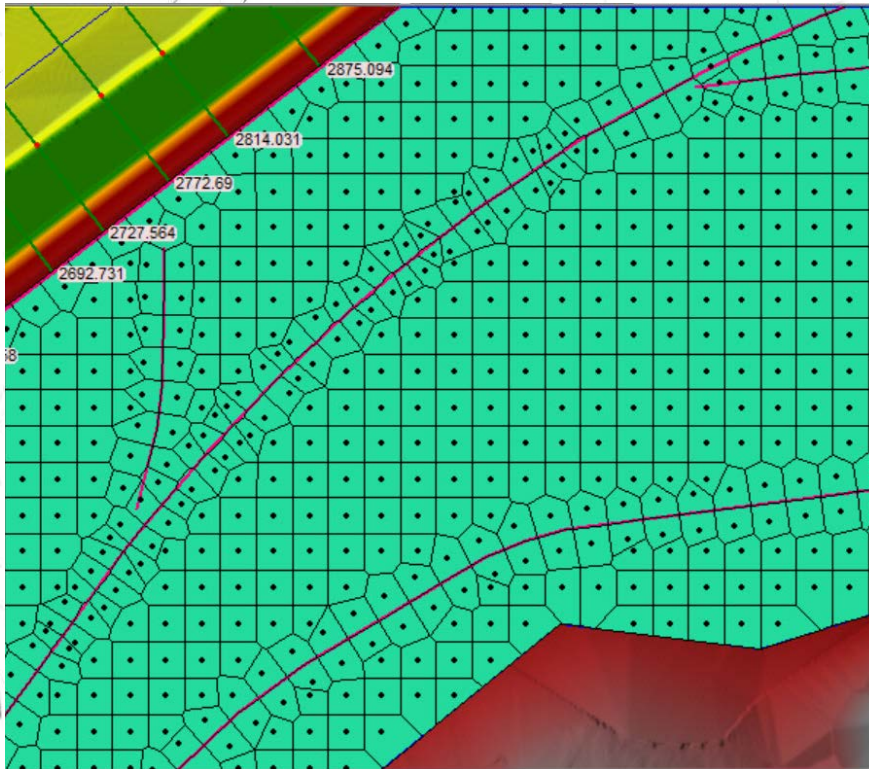


# Adjust Terrain

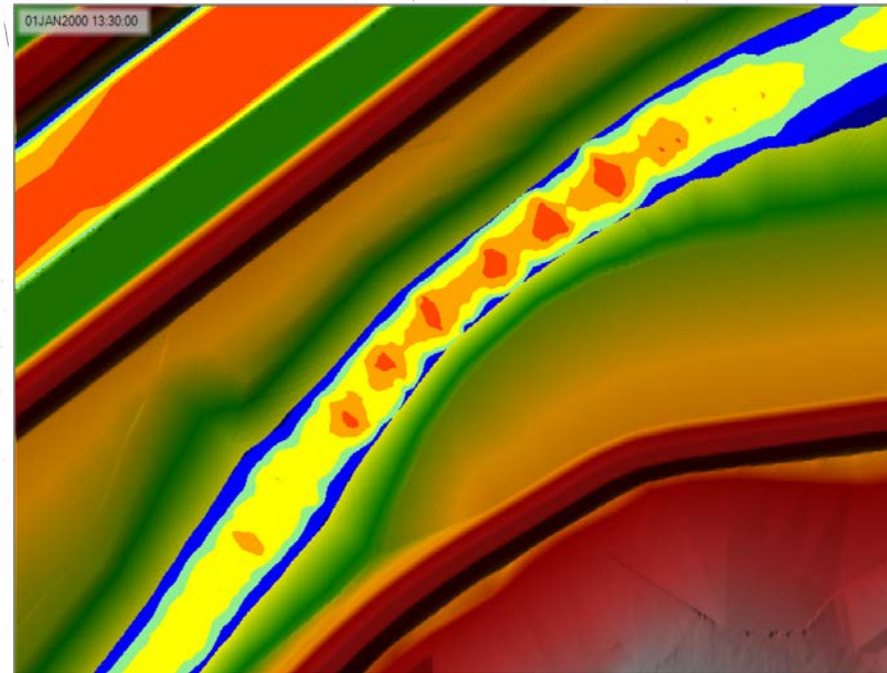
- Can edit terrain in 2d model using:
  - 1d cross sections within RAS
  - Terrain editors in GIS
- Adjustments
  - Step-pool sequence
  - Add sinuosity
  - Disconnect pools
  - Natural in-stream structures
- Could edit n-values as well (in GIS)



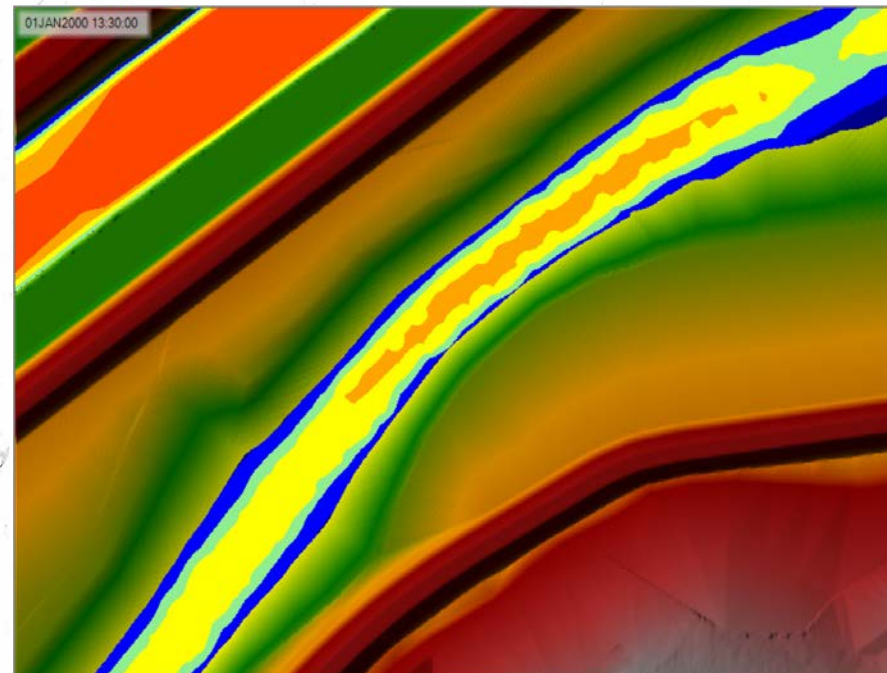
# Adjust Terrain



Adjusted



Base





An aerial photograph of a river delta, likely the Mississippi River Delta, showing a complex network of waterways and land. A semi-transparent rectangular box is overlaid on the center of the image, containing the word "Questions?" in a bold, black, sans-serif font.

**Questions?**